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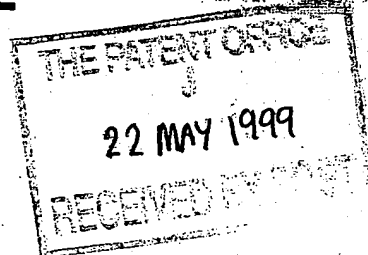
Stephen Hordley

Dated

23 August 2002

Request for grant of a patent

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The Patent Office

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1. Your reference
P23589/HGR/NHE/GMU

2. Patent application number
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9911843.2

22 MAY 1999

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

William Plenderleith
4 Addison Gardens
Douglas
LANARK
ML11 OPW

Patents ADP number (*if you know it*)

If the applicant is a corporate body, give the country/state of its incorporation

7666613001

4. Title of the invention

"Sports Vehicle"

5. Name of your agent (*if you have one*)

Murgitroyd & Company

"Address for service" in the United Kingdom to which all correspondence should be sent (*including the postcode*)

373 Scotland Street
GLASGOW
G5 8QA

Patents ADP number (*if you know it*) 1198013

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number

Country

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Number of earlier application

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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (*Answer 'Yes' if:*

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| Claim(s) | 3 |
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I/We request the grant of a patent on the basis of this application.

Signature

Murgitroyd & Co.

Date

Murgitroyd & Company

21 May 1999

12. Name and daytime telephone number of person to contact in the United Kingdom

Graham Murnane
0141 307 8400

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1 **SPORTS VEHICLE**

2

3 This invention relates to a device that enables a
4 person to travel downhill over terrain whose surface
5 characteristics would render the use of a skateboard or
6 snowboard impracticable.

7

8 Devices such as the skateboard and snowboard are well
9 known. The skateboard enables its user to travel over
10 surfaces such as tarmac and concrete, which are
11 relatively smooth and firm. The snowboard enables its
12 user to travel over snow-covered surfaces, which offer
13 a low coefficient of friction. Neither of these
14 devices is suitable for travelling over grassland or
15 any other terrain that lacks the smoothness and
16 firmness required by the skateboard and the low
17 coefficient of friction required by the snowboard.

18

19 The object of this invention is to provide a device
20 that enables its user to indulge in pursuits similar to
21 skateboarding and snowboarding over terrain such as
22 grassland.

23

24 According to a first aspect of the present invention,
25 there is provided a vehicle for travelling over

1 grassland and similar terrain, said vehicle comprising
2 a substantially horizontal platform having attached to
3 its underside one or more rotors each having an upper
4 surface and an underside, each of said one or more
5 rotors arranged to rotate about a substantially
6 vertical axis, the underside of each of said one or
7 more rotors being substantially convex in form.
8 Preferably, said vehicle has two rotors.

9
10 Preferably, said platform is resiliently pliable.
11 Preferably, said platform comprises a first area on its
12 upper side towards the front of said platform adapted
13 to receive one foot of the user, and a second area on
14 its upper side towards the rear of said platform
15 adapted to receive the other foot of the user, said
16 platform comprising a central portion between said
17 first and second areas adapted to flex resiliently
18 about a lateral axis in the plane of said platform.
19 Preferably, said first and second areas are provided
20 with boot or shoe retention means. Preferably, said
21 platform comprises a hinge mechanism extending
22 laterally across said platform to aid pliability.

23
24 Preferably, said central portion comprises a portion of
25 said platform having a reduced cross-sectional area.
26 Preferably, said central portion comprises a waist
27 portion of the platform having a reduced width.

28
29 Preferably, each of said one or more rotors is
30 supported on a spindle attached to the underside of
31 said platform. Preferably, said vehicle further
32 comprises additional support means adapted to provide
33 additional support for each of said one or more rotors
34 in addition to said spindle. Preferably, said
35 additional support means is either a plurality of idler
36 wheels or rollers. Alternatively, each of said one or

1 more rotors is supported solely by either a plurality
2 of idler wheels, a plurality of rollers, or a plurality
3 of balls.

4
5 Preferably, each of said one or more rotors is solid.

6
7 Alternatively, each of said one or more rotors is
8 hollow, said upper surface of each of said one or more
9 rotors being substantially concave in form.

10 Preferably, said platform is shaped so as to follow the
11 form of said concave upper surface of each of said one
12 or more hollow rotors.

13
14 Preferably, the underside of each of said one or more
15 rotors is substantially in the form of part of the
16 surface of a sphere. Alternatively, the underside of
17 each of said one or more rotors may be substantially in
18 the form of part of the surface of an ellipsoid, a
19 truncated cone, or a truncated toroid.

20
21 Preferably, said vehicle further comprises means for
22 the attachment of a sail, to permit the user to
23 traverse substantially level terrain.

24
25 Preferably, the platform and rotors are made of
26 composite plastics materials, and the other parts that
27 support the rotors are made of metal, but the platform
28 may instead be made of natural materials, such as wood,
29 and the rotors may be made of metal.

30
31 According to a second aspect of the present invention
32 there is provided a vehicle for travelling over
33 grassland and similar terrain, said vehicle comprising
34 a substantially horizontal platform having attached to
35 its underside three or more rotors arranged
36 longitudinally, at least one of said rotors having a

1 first inclined axis, and at least one rotor having a
2 second inclined axis inclined in the opposite sense to
3 said first inclined axis.

4

5 A preferred embodiment of the invention will now be
6 described with reference to the accompanying drawings
7 in which:

8

9 Fig 1 shows a side elevation and plan view of the
10 device;

11

12 Fig 2 shows an end elevation and plan view of the
13 device with the platform parallel to the ground;

14

15 Fig 3 shows an end elevation and plan view of the
16 device with the platform tilted to one side;

17

18 Fig 4 shows a side elevation and plan view of the
19 device when positioned on a sloping surface;

20

21 Fig 5 shows a side elevation and plan view of a twin
22 rotor embodiment of the device with the platform flat;

23

24 Fig 6 shows a side elevation and plan view of a twin
25 rotor embodiment of the device with the platform curved
26 upwards towards its ends;

27

28 Fig 7 shows a side elevation and plan view of a twin
29 rotor embodiment of the device with the platform curved
30 downwards towards its ends;

31

32 Fig 8 shows a section through a rotor mounting
33 arrangement with a central spindle;

34

35 Fig 9 shows a section through a solid rotor;

36

1 Fig 10 shows a section through a hollow rotor;

2

3 Fig 11 shows a section through a rotor mounting
4 arrangement with no central spindle; and

5

6 Fig 12 shows a section through a platform that follows
7 the form of the rotors.

8

9 As shown in Fig 1, the device comprises a platform (1)
10 capable of supporting the user and having on its
11 underside one or more rotors (2). Each rotor rotates
12 about a spindle (3), which is attached at one end to
13 the underside of the platform with its axis
14 perpendicular to the underside of the platform. The
15 user stands on the platform, with his feet in
16 approximately the position shown (4), and he may adopt
17 a crouching stance to enable him to grip handgrips (5)
18 located at each end of the platform.

19

20 When the platform (1) is parallel to the ground, as
21 shown in Fig 2, the point of contact with the ground
22 (as seen in plan view) is coincident with the centre of
23 the rotors (2), and any force applied in the plane of
24 the platform will not result in a turning moment being
25 applied to the rotors. However, when the platform is
26 tilted to one side, as shown in Fig 3, the point of
27 contact with the ground is not coincident with the
28 centre of the rotors, and a force applied to the
29 platform (1) will normally cause a turning moment to be
30 applied to the rotors (2).

31

32 As shown in Fig 4, when the platform (1) is resting on
33 a sloping surface of sufficient gradient, and is tilted
34 in a direction other than the direction of maximum
35 gradient, the turning moment induced in the rotors (2)
36 is sufficient to overcome the friction that exists at

1 the point of contact with the ground, and the device
2 travels in a downhill direction.

3

4 Fig 5 shows an embodiment of the device having two
5 rotors (2) and a pliable platform (1) with handgrips
6 (5) at each end. When the platform is flat, the
7 imaginary lines joining the centre of each rotor (2) to
8 its point of contact with the ground (as seen in plan
9 view) are perpendicular to the longitudinal axis of the
10 platform, and the device travels in the direction of
11 the longitudinal axis. However, if the ends of the
12 platform are pulled upwards by the user, causing the
13 platform (1) to assume a curvature of the type shown in
14 Fig 6, the imaginary lines joining the centre of each
15 rotor (2) to its point of contact with the ground are
16 no longer perpendicular to the longitudinal axis and
17 the device steers towards the side to which it has been
18 tilted. Conversely, if the ends of the platform (1)
19 are pushed downwards by the user, causing the platform
20 to assume a curvature of the type shown in Fig 7, the
21 device steers towards the opposite side.

22

23 One embodiment of the device is shown in Fig 8. In
24 this embodiment, handgrips (5) are provided by
25 extending the length of the platform (1) beyond the
26 outer edge of the rotors (2). A metal spindle (3) is
27 attached by bolts or other means to the underside of
28 the platform (1). Rolling element bearings (6) are
29 fitted between the spindle and the rotor to reduce the
30 friction and wear arising from rotation of the rotor on
31 the spindle, and the assembly is made secure by a nut
32 (7) on the end of the spindle.

33

34 The underside of the rotors (2) may take a variety of
35 forms, including a segment of a sphere, a segment of an
36 ellipsoid, a truncated cone, a truncated toroid or a

1 combination of these forms. The choice of form is
2 dictated by the contact area required to prevent the
3 rotor sinking into the ground; the nature of the
4 undulations inherent in the terrain over which the
5 device is to be used; and the requirement that the
6 device should not be unduly difficult to balance.

7
8 The rotors (2) may be of solid construction, as shown
9 in Fig 9, or hollow construction, as shown in Fig 10.
10 Hollow rotors may have internal ribs to increase their
11 stiffness. Where hollow construction is used, one or
12 more idler wheels (8) may be employed to provide
13 additional support to the rotors (2), as shown in
14 Fig 10. In general, a plurality of idler wheels,
15 rollers or balls (9) may be used to support the rotors,
16 either instead of a central spindle (3), as shown in
17 Fig 11, or in addition to a central spindle.

18
19 Where hollow rotors are used, the platform (1) may be
20 formed in such a way that it follows the form of the
21 upper surface of the rotors (2), as shown in Fig 12;
22 the user's feet being placed in the concave section of
23 the platform. This configuration enables the user to
24 remain closer to the ground and to stand on a surface
25 that is approximately parallel to the ground. In
26 addition, this concave section could be adapted to
27 provide a flat, horizontal surface for the user's feet
28 when the platform is tilted to the appropriate angle.

29
30 A further embodiment of the invention is shown in
31 Figure 13 which has three rotors (2) mounted to the
32 underside of the platform (1). The two rotors (2a) at
33 the ends of the platform (1) are angled in one
34 direction, whilst the middle rotor (2b) is angled in
35 the opposite direction to the end rotors (2a) but at
36 the same angle. With this arrangement, the platform

1 (1) remains horizontal, but the device can still be
2 steered by deflection of the platform (1) as with the
3 other embodiments.

4

5 The device could also be provided with means to which a
6 sail and mast may be attached, if the user was to
7 traverse substantially level terrain. The attachment
8 of such a sail would therefore enable the user to cross
9 terrain with the minimum of effort being required.

10

11 Pliability of the platform (1) may be achieved by
12 constructing it entirely of flexible materials, or by
13 using a combination of rigid materials in the vicinity
14 of the user's feet and flexible materials for the
15 middle portion. A region of reduced cross-sectional
16 area may also be incorporated in the platform to
17 facilitate deflection, or a mechanical hinge may be
18 employed.

19

1 CLAIMS

- 2
- 3 1. A vehicle for travelling over grassland and
4 similar terrain, said vehicle comprising a
5 substantially horizontal platform having attached
6 to its underside one or more rotors each having an
7 upper surface and an underside, each of said one
8 or more rotors arranged to rotate about a
9 substantially vertical axis, the underside of each
10 of said one or more rotors being substantially
11 convex in form.
- 12
- 13 2. A vehicle as claimed in Claim 1, wherein said
14 vehicle has two rotors.
- 15
- 16 3. A vehicle as claimed in either Claim 1 or Claim 2,
17 wherein said platform is resiliently pliable.
- 18
- 19 4. A vehicle as claimed in Claim 3, wherein said
20 platform comprises a first area on its upper side
21 towards the front of said platform adapted to
22 receive one foot of the user, and a second area on
23 its upper side towards the rear of said platform
24 adapted to receive the other foot of the user,
25 said platform comprising a central portion between
26 said first and second areas adapted to flex
27 resiliently about a lateral axis in the plane of
28 said platform.
- 29
- 30 5. A vehicle as claimed in Claim 4, wherein said
31 central portion comprises a hinge mechanism
32 extending laterally across said platform.
- 33
- 34 6. A vehicle as claimed in any preceding claim,
35 wherein each of said one or more rotors is
36 supported on a spindle attached to the underside

1 of said platform.
2

3 7. A vehicle as claimed in Claim 6, wherein said
4 vehicle further comprises additional support means
5 adapted to provide additional support for each of
6 said one or more rotors in addition to said
7 spindle.
8

9 8. A vehicle as claimed in Claim 7, wherein said
10 additional support means is a plurality of idler
11 wheels.
12

13 9. A vehicle as claimed in Claim 7, wherein said
14 additional support means is a plurality of
15 rollers.
16

17 10. A vehicle as claimed in any of Claims 1 to 5,
18 wherein each of said one or more rotors is
19 supported by a support means selected from the
20 group of support means comprising a plurality of
21 idler wheels, a plurality of rollers, and a
22 plurality of balls.
23

24 11. A vehicle as claimed in any preceding claim,
25 wherein each of said one or more rotors is solid.
26

27 12. A vehicle as claimed in any of Claims 1 to 10,
28 wherein each of said one or more rotors is hollow,
29 said upper surface of each of said one or more
30 rotors being substantially concave in form.
31

32 13. A vehicle as claimed in Claim 12, wherein said
33 platform is shaped so as to follow the form of the
34 concave upper surface of each of said one or more
35 hollow rotors.
36

- 1 14. A vehicle as claimed in any preceding claim,
2 wherein the underside of each of said one or more
3 rotors is substantially in the form of part of the
4 surface of a sphere.
5
- 6 15. A vehicle as claimed in any of Claims 1 to 13,
7 wherein the underside of each of said one or more
8 rotors is substantially in the form of part of the
9 surface of a shape selected from the group of
10 shapes comprising ellipsoids, truncated cones, and
11 truncated toroids.
12
- 13 16. A vehicle for travelling over grassland and
14 similar terrain, said vehicle comprising a
15 substantially horizontal platform having attached
16 to its underside three or more rotors arranged
17 longitudinally, at least one of said rotors having
18 a first inclined axis, and at least one rotor
19 having a second inclined axis inclined in the
20 opposite sense to said first inclined axis.
21
- 22 17. A vehicle substantially as hereinbefore described
23 and illustrated in the accompanying drawings.

1 **ABSTRACT**

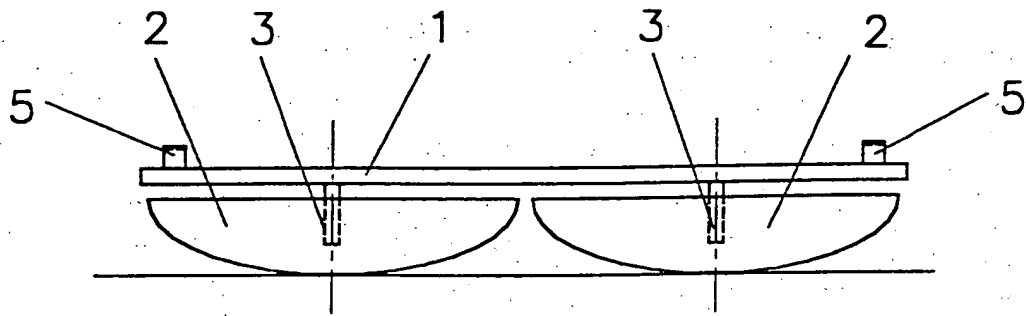
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3 A sports vehicle includes a substantially horizontal
4 platform (1) capable of supporting the user and having
5 attached to its underside one or more rotors (2)
6 arranged to rotate about substantially vertical axes,
7 the underside of each rotor being substantially convex
8 in form. The device enables its user to travel over
9 grassland and similar terrain in a manner similar to
10 skateboarding and snowboarding.

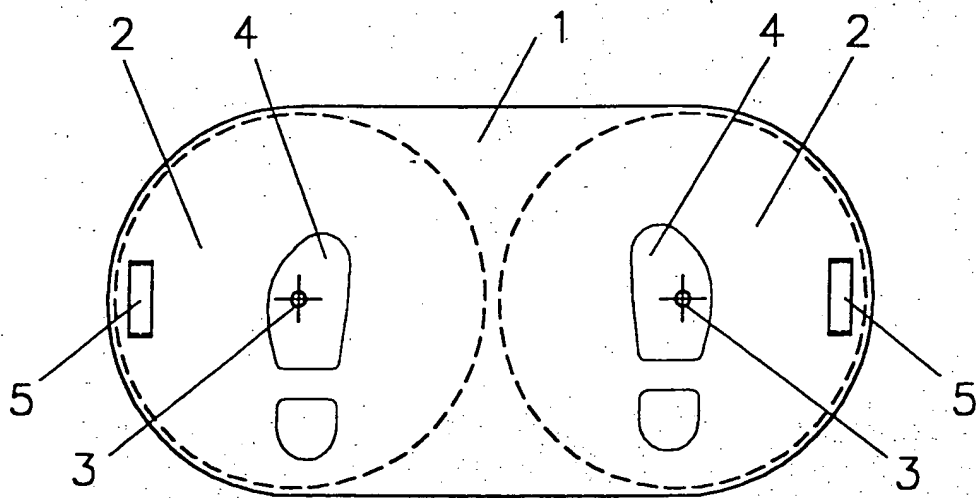
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SIDE ELEVATION



PLAN

FIGURE 1

2/10

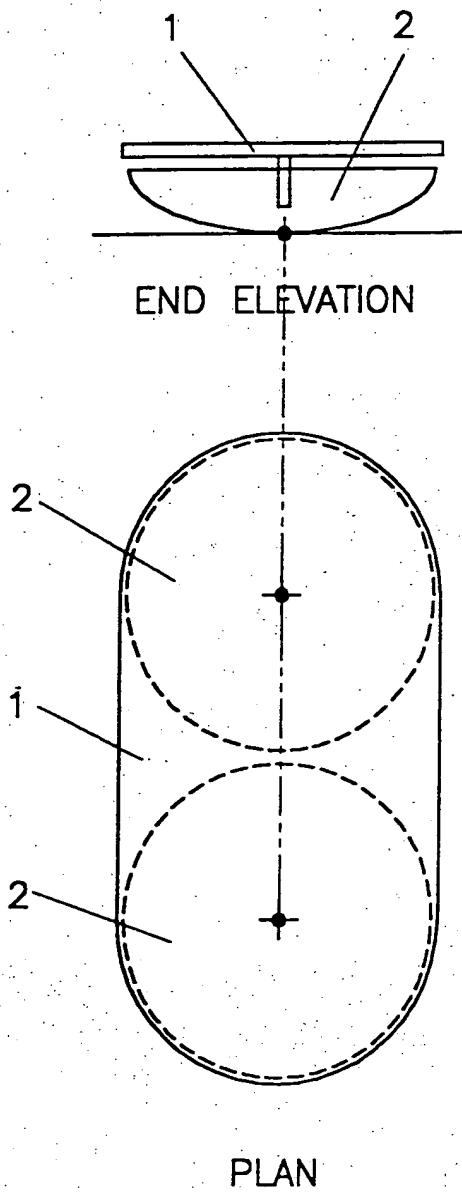


FIGURE 2

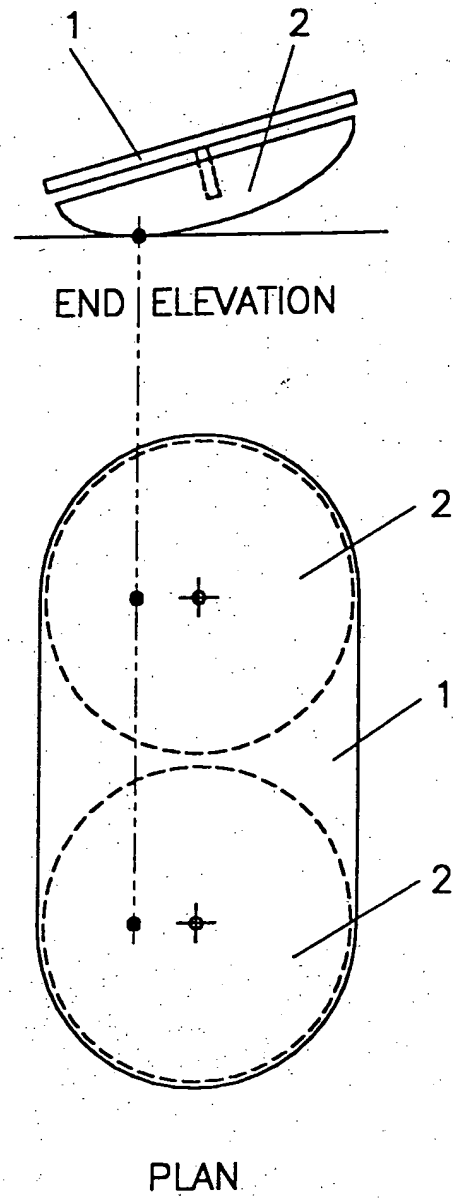
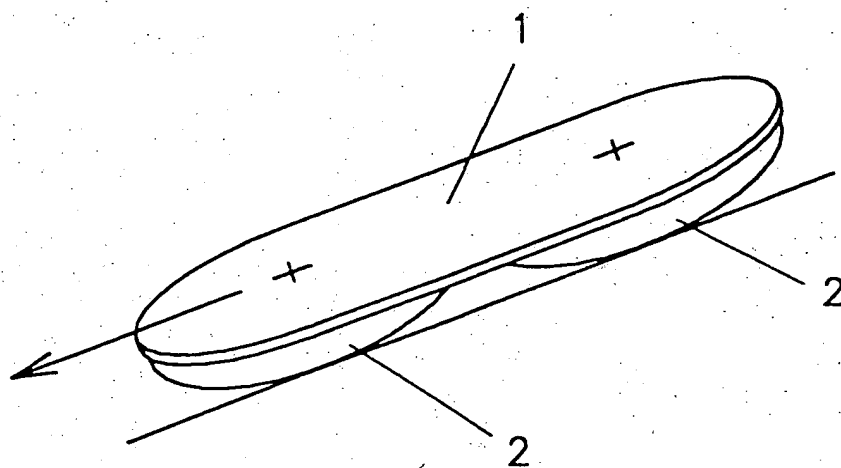
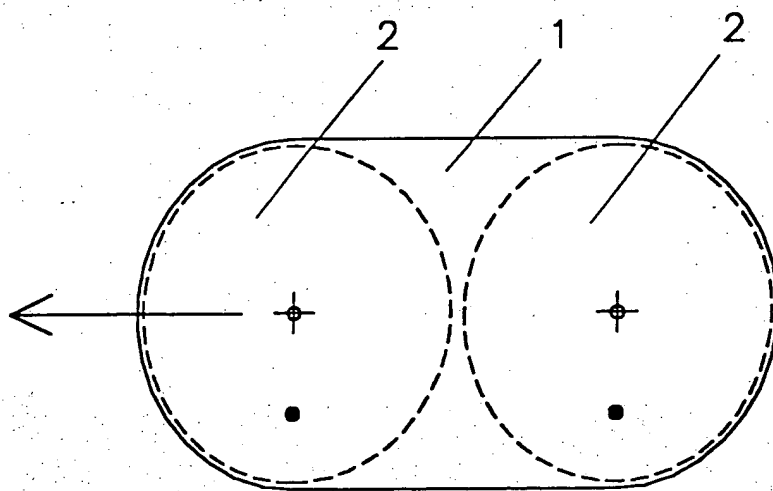


FIGURE 3

3/10



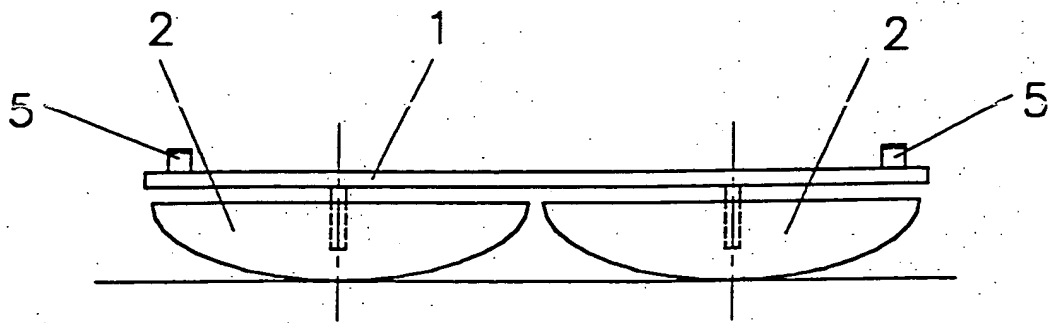
SIDE ELEVATION



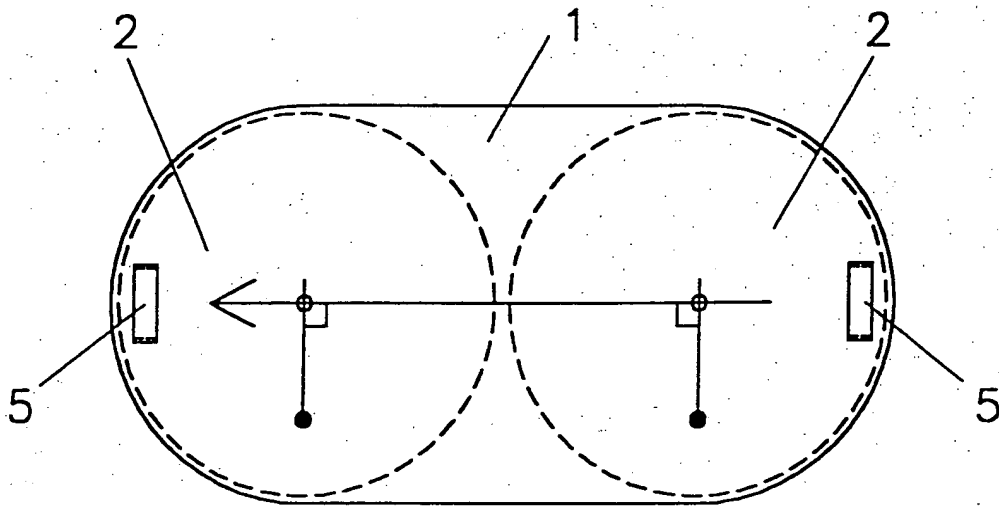
PLAN

FIGURE 4

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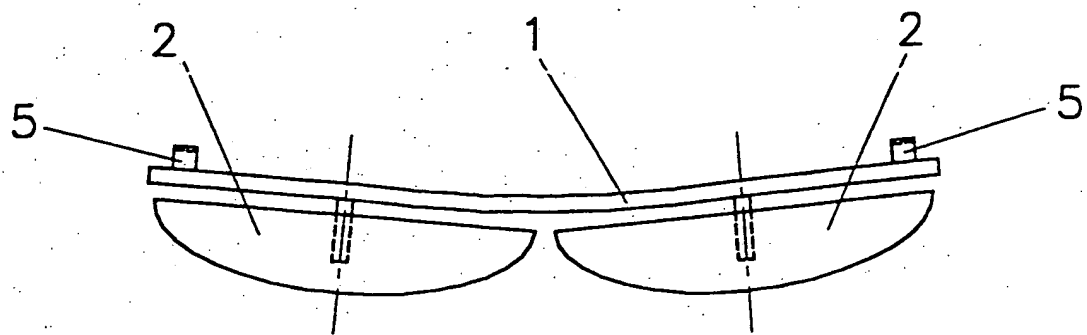
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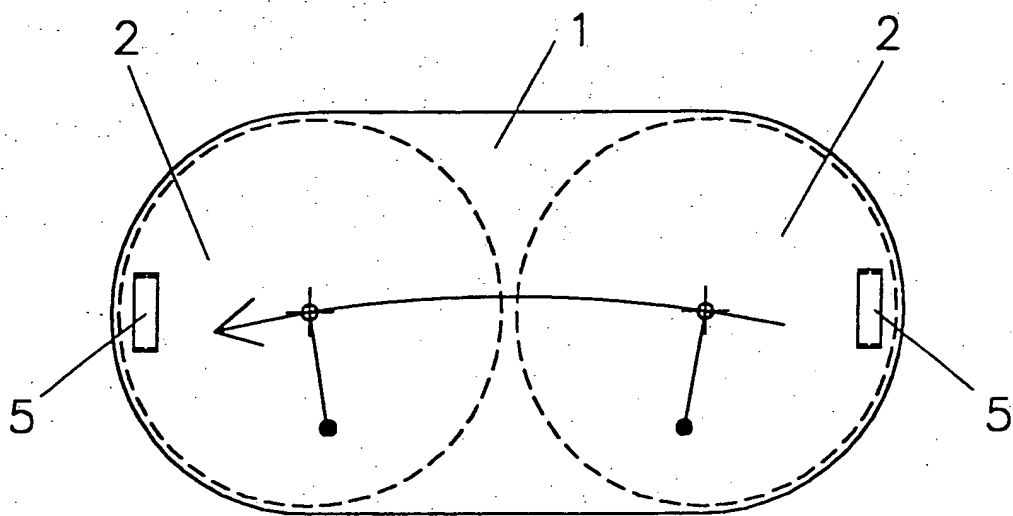
PLAN

FIGURE 5

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SIDE ELEVATION



PLAN

FIGURE 6

6/10

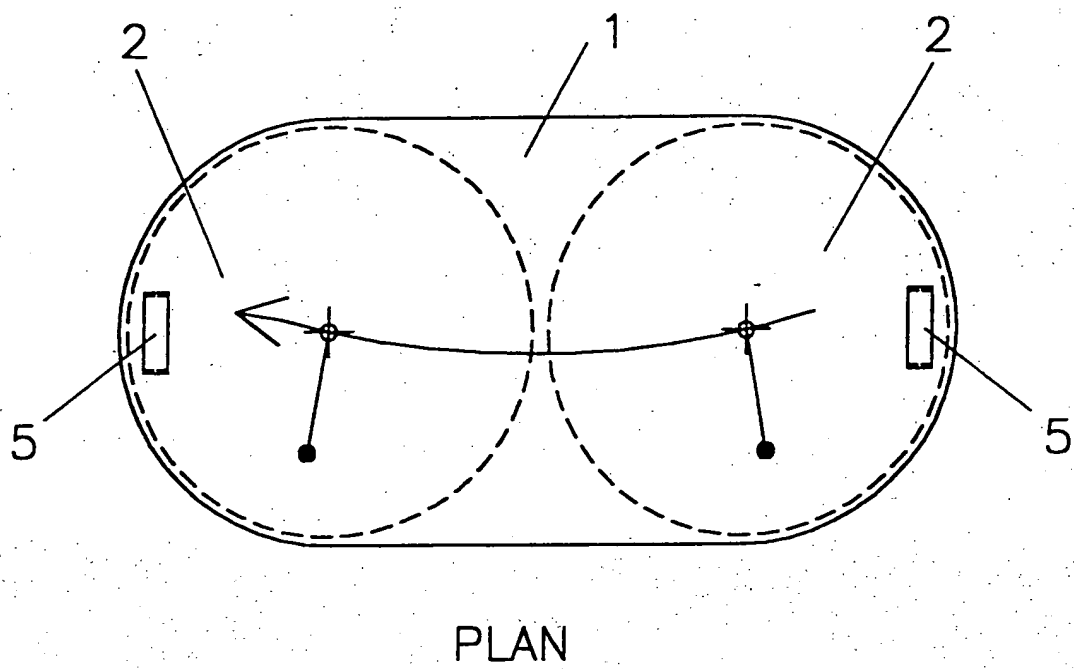
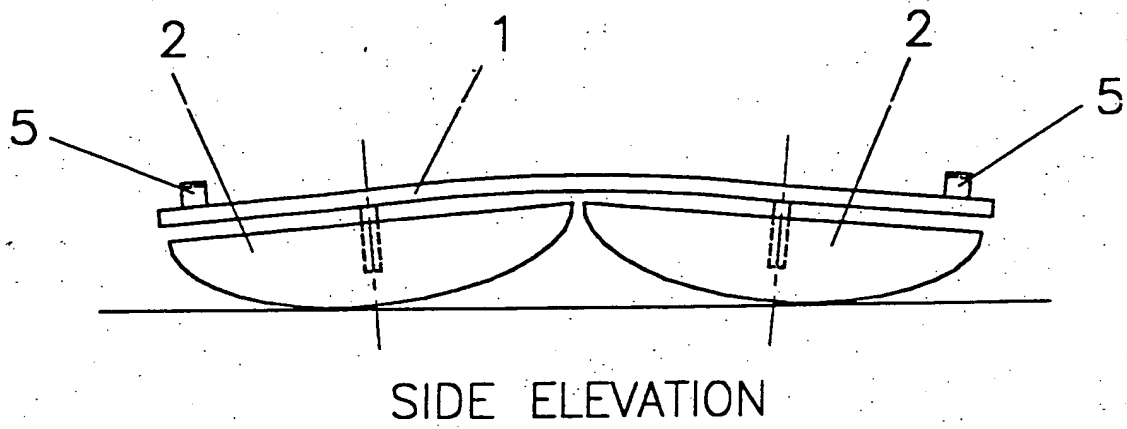
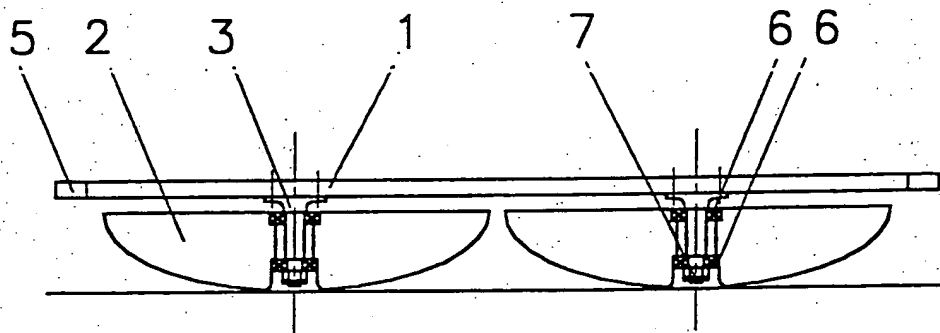
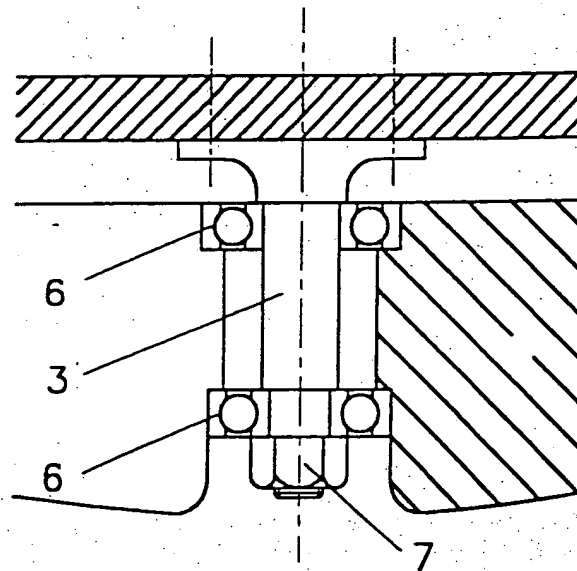


FIGURE 7

7/10



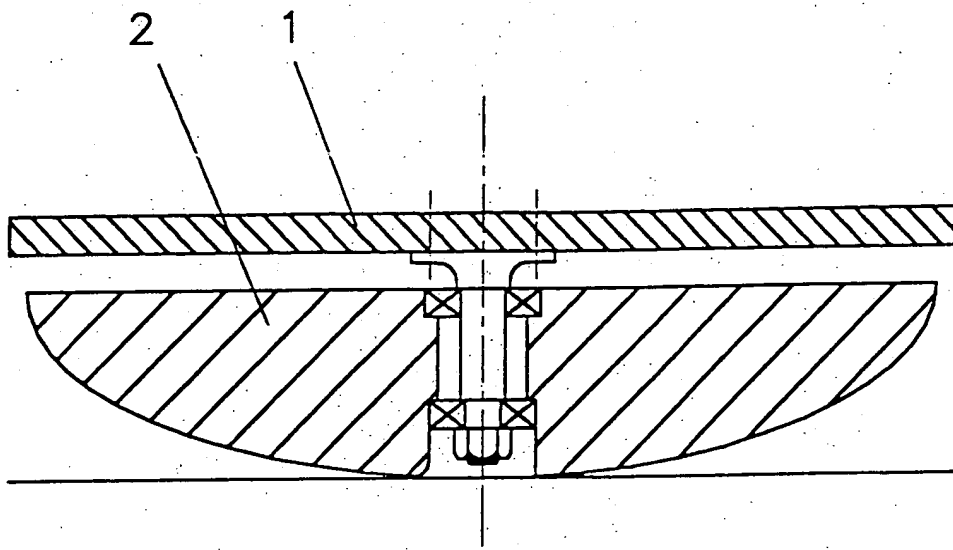
LONGITUDINAL SECTION



DETAIL AT SPINDLE

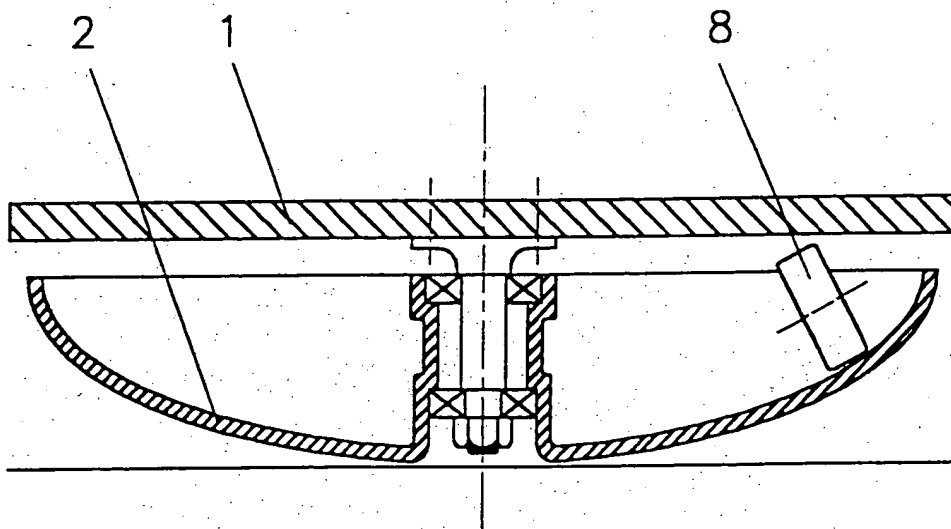
FIGURE 8

8/10



SECTION

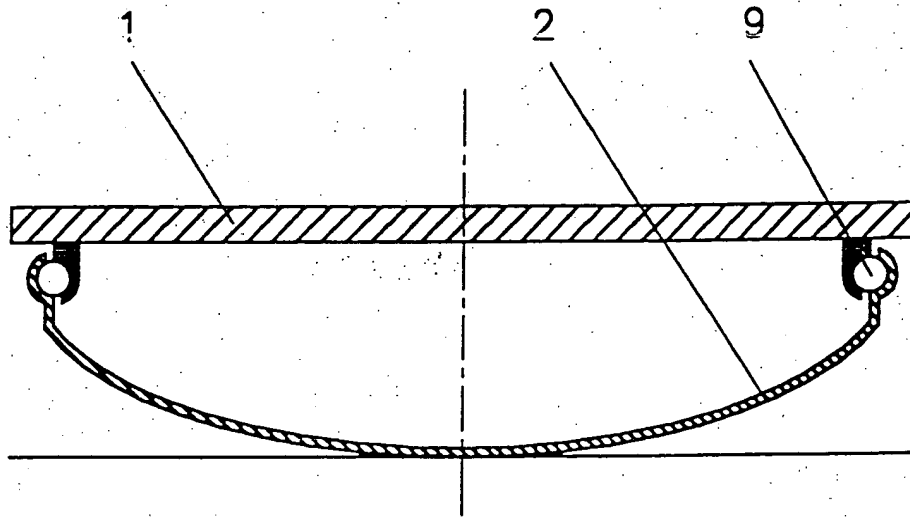
FIGURE 9



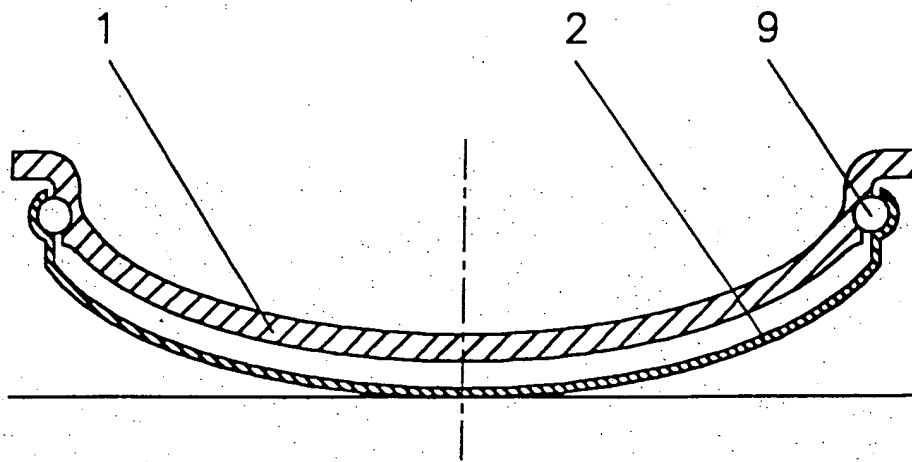
SECTION

FIGURE 10

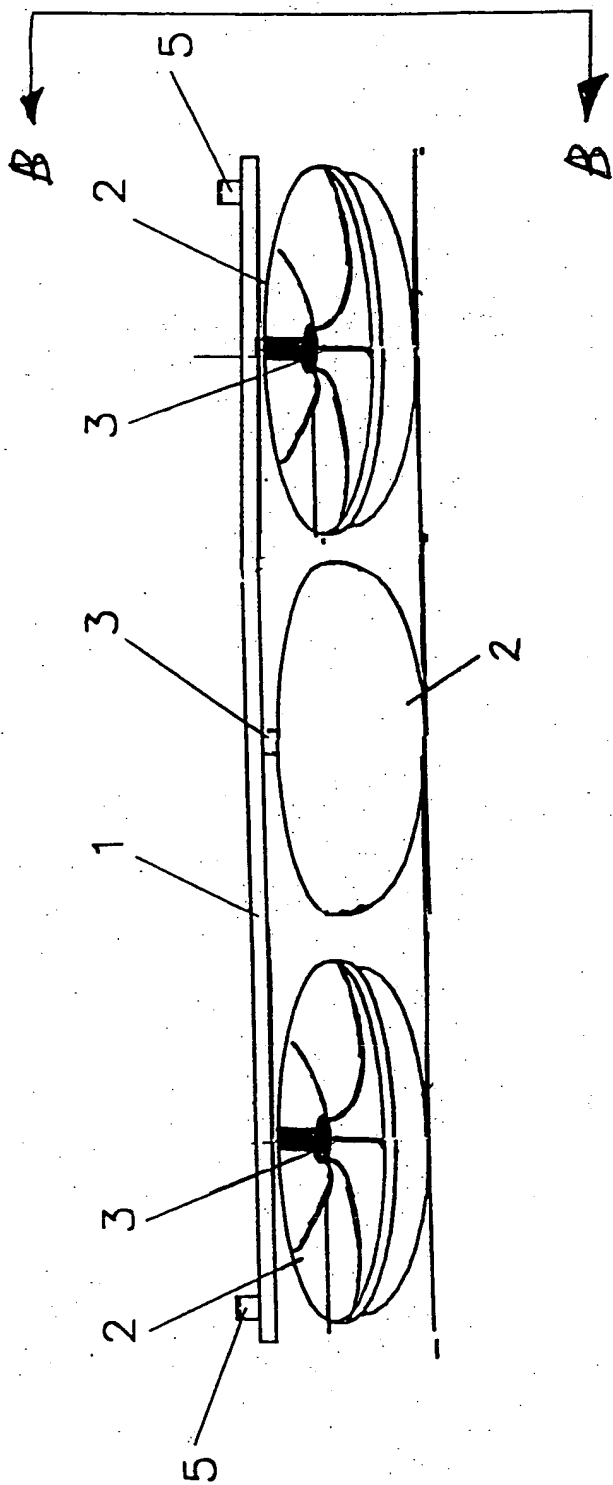
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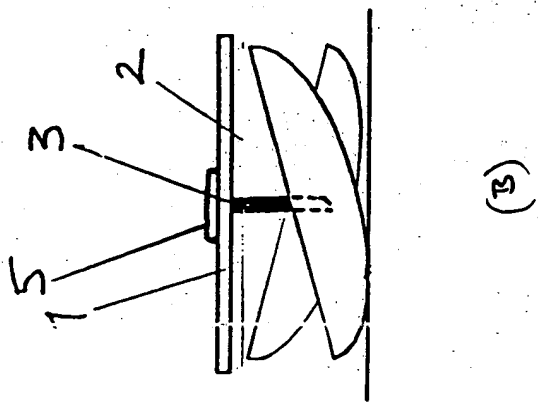
SECTION
FIGURE 11



SECTION
FIGURE 12



(A)



(B)

Figure 13